

The University of Chicago

Factors Affecting Regularity of the Flow of Words During Written Composition

**A PART OF A DISSERTATION SUBMITTED TO THE FACULTY
OF THE DIVISION OF THE SOCIAL SCIENCES IN CANDIDACY
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

**DEPARTMENT OF EDUCATION
1946**

**By
JOHN ANDREW VAN BRUGGEN**

**Reprinted from
JOURNAL OF EXPERIMENTAL EDUCATION
Vol. 15, No. 2, December, 1946**

The University of Chicago

FACTORS AFFECTING REGULARITY
OF THE FLOW OF WORDS DURING
WRITTEN COMPOSITION

A PART OF A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE
SOCIAL SCIENCES IN CANDIDACY FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION
1946

By
JOHN ANDREW VAN BRUGGEN

Reprinted from
JOURNAL OF EXPERIMENTAL EDUCATION
Vol. 15, No. 2, December 1946



FACTORS AFFECTING REGULARITY OF THE FLOW OF WORDS DURING WRITTEN COMPOSITION

JOHN ANDREW VAN BRUGGEN
Grand Rapids, Michigan

SECTION I INTRODUCTION

PROBLEM OF THIS INVESTIGATION

It is a matter of common observation that the flow of words during written composition is not regular and continuous. The periods of writing are irregular as well as the periods of reflection. Ideas seem to come at varying rates. The aim of this investigation is to obtain a quantitative measure of the rate of flow of words during written expression and to determine what factors affect it. This general aim will be achieved by comparing the rate of flow of words during the writing of each of two compositions by junior high school students with various test scores, ratings, and personal data.

The problem will be considered in four divisions. In the first a study will be made of the factors within the compositions that may affect the rate of the flow of words. Such aspects of the problem as writing on familiar and unfamiliar material, linguistic constructions, length, and general excellence of compositions will be considered.

The second division will treat the relation of academic achievement in the school subjects involving language skills to the rate of flow of words. Consideration will be given to the pupils' achievement in reading, spelling, and various phases of language.

In the third division several personal and environmental factors will be discussed. An attempt will be made to find the effect on flow of words of chronological age, grade in school, intelligence, perseverance, personality traits, handedness, eye dominance, sex, and such environmental factors as socio-economic status and position among other children in the family.

The fourth division will include analyses and comparisons of individual records. A detailed analysis will be made of the records of the nine compositions with the highest rating for quality and of the nine compositions with

the lowest rating. The results will be compared to determine differences in flow of words between good and poor compositions. The records of the five compositions with the lowest indices of word flow and of the five compositions with highest indices of word flow will be analyzed and compared to find any relationship that may exist between the ability to write in thought units and the rate of flow of words.

The problem of this investigation is (1) to study the rate of flow of words during the writing of compositions to determine how it is affected by various compositional, academic, personal, and environmental factors; and (2) to analyze the records of flow of words for the individual pupils to discover how the composing structure—that is, the number, length, and location of pauses between words—differs in compositions of superior and inferior quality and in compositions written with rapid and slow flow of words.

SECTION II METHOD OF INVESTIGATION

SOURCE OF DATA

The subjects.—The compositions of eighty-four pupils in the junior high grades of the Oakdale Christian School in Grand Rapids, Michigan, were used as the basis for this investigation. To keep constant the factors pertaining to school training, such as English curriculum and type of teaching, only those pupils were selected who had attended this school without interruption through all the grades, beginning with the first grade.

The subjects were distributed according to grades as follows: eight girls and thirteen boys from the seventh grade, twenty-three girls and nineteen boys from the eighth grade, and eleven girls and ten boys from the ninth grade. Originally another ninth grade girl was included, but the record of her writing proved faulty and had to be discarded. This left forty-two girls and forty-two boys.

The chronological ages of the subjects ranged from 146 months to 182 months with a median of 163 and a standard deviation of 9.18.

The compositions.—Each pupil who participated in this investigation was asked to write at three different sittings during May and June of 1943. Approximately ten days elapsed between writing periods. The writing was done in the music studio of the school while the subject was alone and free from the distractions of others.

During the first writing period the pupils wrote from memory the first seven sentences of Lincoln's Address at Gettysburg. This selection had been assigned for memorization to the junior high literature classes shortly before the time of this writing, and, consequently, it allayed any suspicions or fears of those who were asked to participate. Inasmuch as this first session was intended merely to give a record that could be used for determining speed of actual writing, it provided a splendid opportunity for practice.

Only two pupils were called to the place of writing at the same time. While one was writing in the studio, the other was in an adjoining room where he was asked by an examiner to recite the Address at Gettysburg. The few who could not recite fluently were instructed to spend some more time on the selection, and they were called back a few days later.

During the second period of writing the subjects were asked to reproduce the story of Androcles and the Lion. In preparation for this writing each pupil, upon entering the waiting room, was given a typewritten copy of the story and was instructed to read it carefully for the purpose of reproducing it. After the reading his comprehension was tested by an examiner. He was asked to answer orally fifteen questions dealing with the content of the story.

It was assumed that when pupils reproduced a story immediately after reading it, they were writing familiar material. The second selection of writing, which was the first composition of the subjects, was considered, therefore, as a sample of writing on familiar material.

For the third writing period the subjects were instructed to write a composition on one of six topics. A typewritten sheet with the following instructions was handed to the subjects as they entered the waiting room:

Here is a list of six topics. You may select any one of them for a composition. You may change the wording in some of them if you wish.

You will be given five minutes to decide on your topic and to plan your writing.

1. My Most Embarrassing Experience.
2. An Incident of My Vacation.
3. A Dream.
4. The Best Story I Ever Read.
5. A Most Exciting Experience.
6. The First Time I Went Fishing (Hunting, Bowling, etc.).

This third writing selection, the second composition, was regarded as a sample of writing on unfamiliar material.

NATURE OF DATA

Records of the regularity of the flow of words.—Records of the regularity of the flow of words during the writing of the three selections were obtained by means of a motor driven, time recording kymograph. This apparatus is so constructed that a motor driven roller draws a strip of paper two inches wide over the flat surface or table of the machine. A punch set over the top of the machine is connected with a synchronous motor and a magnetic coil. A disc on the synchronous motor has fifty evenly spaced wires drawn over its outer edge. These are fastened to a copper ridge near the center of the disc. A copper spring connected to the magnetic coil scrapes along the ridge as the disc turns and connects the wire with the coil.

Two small rollers, which are connected with the coil, extend from the machine to the outer edge of the disc and touch the wires as the disc turns. The rollers are spaced so that when one touches a wire, the other is half way between wires. When the roller touches the wire, contact is made with the coil, and the coil draws the punch down to make a depression on the paper. Since the synchronous motor makes one revolution per minute and there are fifty strands of wire around the outer edge of the disc and each strand is touched twice during every turn, contact with the magnetic coil is produced one hundred times per minute. This means that a depression is made on the paper every six-tenths of a second as the paper is drawn through the machine.

A pencil set in a swinging bracket, that extends from the table of the machine over the paper, makes a line on the paper as it is drawn across the table. The bracket is shifted by another magnetic coil that is connected with a copper stylus and plate. When the stylus touches the plate and makes contact, the bracket shifts so as to make an indentation in the line that is being drawn on the paper.

The machine was located in a room across the hall from the studio in which the subjects did their writing. The stylus and contact plate were in the studio and were connected with the machine by wire. This arrangement eliminated the possibility of the subject's hearing the noise of the machine.

In the studio the pupil who did the writing was watched by the examiner, who was seated at a small table with the stylus and contact plate. Between her table and the desk of the pupil was an opaque portable screen in which was mounted a piece of one-way glass about a foot square. Through this glass the examiner could watch the writer without being observed. The subject was conscious of the examiner's presence but could not see her and did not know what she was doing. The examiner got the subjects started at the writing assignment by providing pencil and paper and asking them to let her know when they started writing and when they were finished. She then went to her place back of the screen.

When the pupil placed his pencil on the paper to begin writing a word, the examiner placed the stylus on the contact plate thereby shifting the pencil on the apparatus and indenting the pencil line that was being drawn on the record paper as it passed over the table of the machine. When the writer lifted his pencil at the end of a word, the examiner raised the stylus to break the contact and to shift the pencil on the apparatus back to its original position. If the writer stopped to cross out a word, the crossing out was recorded by the examiner as a word. The pupils had been instructed beforehand to cross out words rather than to erase them. When the pupil came to the end of a line, the examiner touched the contact plate with the stylus three times in rapid succession. This left a mark on the paper that facilitated interpretation of the record.

After the subject had finished writing, his record paper was removed from the machine and his name written on it. The record paper showed a series of depressions down the middle to indicate time in six-tenths of seconds and a broken pencil line along the edge to indicate periods of writing and pauses between words.

The first step toward using the records involved the transfer of the words of the composition to their appropriate indented spaces on the pencil line of the record. This was done quite readily by comparing the paper on which the subject did his writing with his record. The three marks designating the end of a line made it possible to transfer the words of one line at a time.

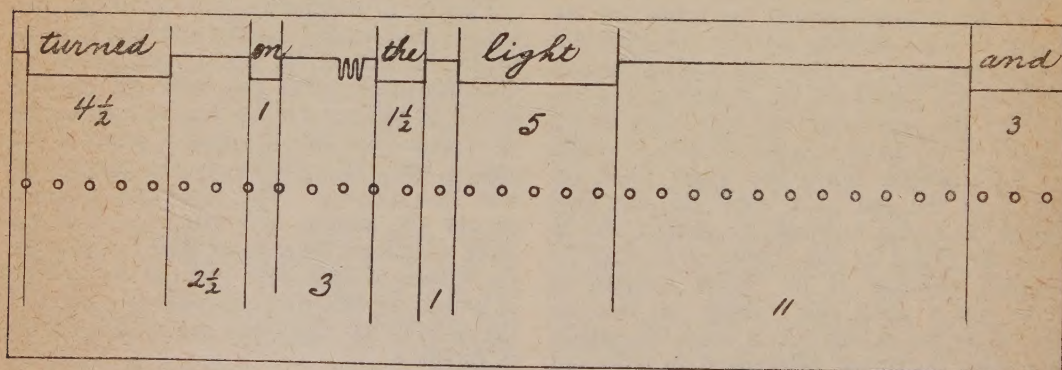
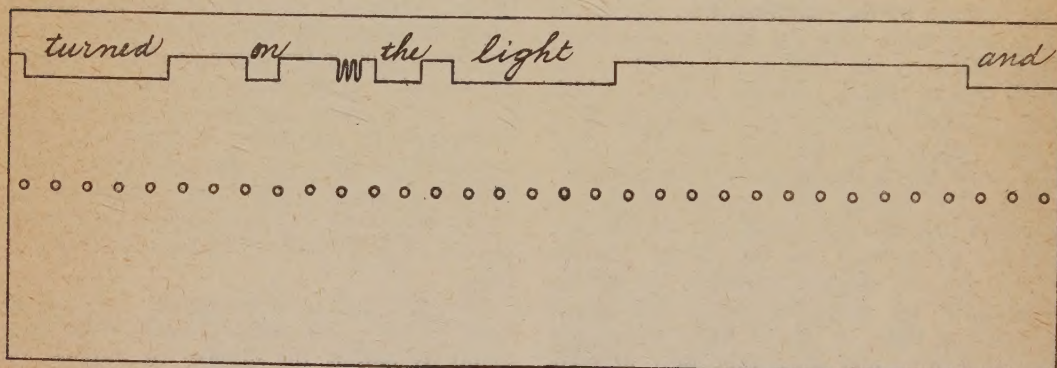
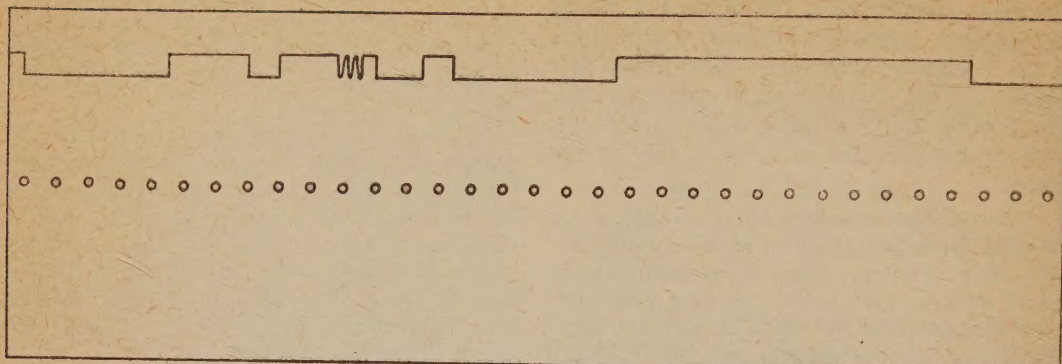
The next step was to determine the length of time used for each word and the pause between words. At each point in the record where the pencil line was broken, another line was drawn across the paper at right angles to the record line. By counting the number of round depressions between these lines and multiplying by six-tenths, the time in seconds was obtained for each word and each pause. The three stages in the interpretation of the record are shown in Plate I, which is a reproduction of part of the third record of Subject One.

After this had been completed, the average time required for writing each word was found by adding the number of seconds for each word and dividing the total by the number of words.

Finally, a distribution was made for each subject showing the number and length of the pauses in each of the two compositions. No distribution of pauses was made for the first record of writing since it was a reproduction of a memorized selection and a record of the pauses was not pertinent to the purpose of this investigation. The distribution sheet showed the number of words in each of the three selections, the average time required for the writing of each word, and the distribution of pauses for the two compositions. A copy of the distribution sheet that was used is shown in Figure 1.

Standardized test scores.—During December of each year standardized achievement tests are administered to all the pupils of the Oakdale Christian School as part of the school's regular testing program. Form E of the Stanford Achievement Test: Advanced

PLATE I



A REPRODUCTION OF PART OF A RECORD ILLUSTRATING THE THREE STEPS
REQUIRED FOR INTERPRETATION.

DISTRIBUTION SHEET

Name _____		Grade _____	
First Record	Second Record	Third Record	
Number of words: _____	Number of words: _____	Number of words: _____	
Seconds per word: _____	Seconds per word: _____	Seconds per word: _____	
Pauses:		Pauses:	
.3		.3	
.6		.6	
.9		.9	
1.2		1.2	
1.5		1.5	
1.8		1.8	
2.1		2.1	
2.4		2.4	
2.7		2.7	
3.0	13.8	3.0	13.8
3.3	14.1	3.3	14.1
3.6	14.4	3.6	14.4
3.9	14.7	3.9	14.7
4.2	15.0	4.2	15.0
4.5	15.3	4.5	15.3
4.8	15.6	4.8	15.6
5.1	15.9	5.1	15.9
5.4	16.2	5.4	16.2
5.7	16.5	5.7	16.5
6.0	16.8	6.0	16.8
6.3	17.1	6.3	17.1
6.6	17.4	6.6	17.4
6.9	17.7	6.9	17.7
7.2	18.0	7.2	18.0
7.5	18.3	7.5	18.3
7.8	18.6	7.8	18.6
8.1	18.9	8.1	18.9
8.4	19.2	8.4	19.2
8.7	19.5	8.7	19.5
9.0	19.8	9.0	19.8
9.3	20.1	9.3	20.1
9.6	20.4	9.6	20.4
9.9	20.7	9.9	20.7
10.2	21.0	10.2	21.0
10.5	21.3	10.5	21.3
10.8	21.6	10.8	21.6
11.1	21.9	11.1	21.9
11.4	22.2	11.4	22.2
11.7	22.5	11.7	22.5
12.0		12.0	
12.3		12.3	
12.6		12.6	
12.9		12.9	
13.2		13.2	
13.5		13.5	

Fig. 1. Sheet Used to Show Distribution of Pauses.

Battery, Partial, was administered to the junior high pupils in December, 1942, approximately five months prior to the time of the writing for this investigation. The scores of the Reading: Paragraph Meaning, Reading: Word Meaning, Language Usage, and Spelling sections of the test were used in this study.

The following tests were administered during February and March of 1943 to the classes participating in this investigation.

The Terman McNemar Test of Mental Ability: Form C.

Co-operative English Test, Test B1: Effectiveness of Expression, Lower Level, Form Q.

Co-operative English Test, Test A: Mechanics of Expression, Form Q.

Aspects of Personality Test, for Grades 4 to 9 Inclusive, by Pintner, Loftus, Forlano, and Alster.

Carroll Prose Appreciation Test for Junior High School.

All of these tests were administered and scored by the writer, and the scores were used in this investigation.

Personal data.—Other information pertaining to the subjects was obtained from the school records. This included the occupation of the father, number of children in the family, number of children older and younger than the subject, chronological age, handedness, and marks in English.

Eye dominance was tested in two ways. A paper funnel with the wide end fitted to the contour of the face was used in the first test. A ball was placed on a shelf about twenty feet away from the subject. He was then asked to look through the funnel with both eyes and locate the ball. After he had located it, a card was inserted in a slot in the funnel so that the left eye was covered. If the subject could still see the ball, he was regarded as having right eye dominance. If he could not see it with his left eye covered, but could see it with his right eye covered, he was regarded as having left eye dominance.

The second test was a card test. A large card about twelve inches square with a small hole about an eighth of an inch in diameter in the middle was given to the subject, and he was asked to look through this hole at the ball on the shelf. Placing the card in front of and looking with the right eye was regarded

as an indication of right eye dominance, and looking with the left eye was regarded as an indication of left eye dominance.

Twelve of the subjects showed a different eye dominance on one test than on the other. They were requested to take both tests again, and in each case the results of the two tests agreed. This lack of agreement in the first testings may have been due to a failure on the part of the subjects to focus correctly when using the funnel.

METHOD OF TABULATING DATA

Finding a measure of the regularity of the flow of words.—After a distribution had been made of the lengths of the pauses between words in each composition, it was necessary to find some measure of the variability of the pauses. This measure could then be used as the measure of the regularity of the flow of words.

The commonly accepted measure of variability is the standard deviation, and it was computed for each of the compositions. They ranged from .28 to 4.73 with a median of 1.26 for the first set of compositions, and from .29 to 8.76 with a median of 1.31 for the second set of compositions. The coefficient of correlation between the standard deviations of the first and second sets of compositions was .48 with a probable error of .06.

Since the standard deviation represents the square root of the squared deviations from the median, its use might emphasize unduly the extremely long pauses in some of the compositions. It was necessary, therefore, to cast about for some measure that would take into account the long pauses without weighting them disproportionately.

The average of all the pauses longer than the median pause, or the average of the higher half of the pauses, was computed for each composition. These averages ranged from .67 to 4.72 with a median of 1.80 for the first group of compositions, and from .80 to 4.33 with a median of 1.89 for the second group. The Pearson product-moment coefficient of correlation was computed for the averages of the first and second sets of compositions and was found to be .77 with a probable error of .03. This is .29 higher than the coefficient of correlation of the standard deviations of the two sets of compositions. If regularity of flow of words is a trait that should be fairly constant in all writing, then the higher coefficient

of correlation would indicate that the average of the higher half of the pauses is a better measure of the flow of words than the standard deviation.

The coefficient of correlation between the standard deviations and the averages of the higher half of the pauses was .91 with a probable error of .01 for the first group of compositions and .92 with a probable error of .01 for the second group. These high coefficients of correlation as well as the high correlation between the sets of compositions seem to justify the use of the average of the higher half of the pauses as a valid measure of regularity of the flow of words. It will be used, therefore, in further comparisons and will be referred to as the index of flow of words. A high index indicates a slow flow of words, and a low index indicates a rapid flow of words.

Comparing data.—The Pearson product-moment coefficient of correlation was used to determine relationship between the indices of flow of words and the other data compiled for this investigation.

Additional light on the relationships was obtained by arranging the scores of the eighty-four subjects in each of the areas investigated in order of rank and dividing them into four equal groups. The mean index of flow of words was then found for each group, or quarter, of the scores. This method proved to be enlightening especially in the areas in which the distribution of scores tended to be curvilinear.

SECTION III

FACTORS WITHIN THE COMPOSITIONS AND THEIR EFFECT ON THE FLOW OF WORDS

In a study of sentence structure in children's compositions Shepherd called attention to content as an important factor in determining sentence structure.¹ Inasmuch as content might also affect the regularity of the flow of words, the compositions submitted by the subjects were carefully analyzed to ferret out any factors that might affect word flow.

FAMILIAR AND UNFAMILIAR MATERIAL

Writing speed.—In an effort to discover any significant changes in the writing speed in the three selections of each subject, a study

¹ Edith Elizabeth Shepherd, *The Influence of Content and Maturity on Sentence Structure in Pupils' Written Discourse*. Unpublished Master's thesis, Department of Education, University of Chicago, 1933.

was made of the average time required per word in the actual writing of each selection.

In the first sample of writing, the portion of Lincoln's Address at Gettysburg, the average time in seconds per word required for actual writing ranged from 1.21 to 2.66 with a median of 1.81 and a standard deviation of .32. In the second selection, the reproduction of a story, the time per word ranged from 1.02 to 2.62 seconds with a median of 1.59 and a standard deviation of .29; and in the writing of compositions on selected topics the time per word ranged from 1.24 to 2.63 seconds with a median of 1.62 and a standard deviation of .24.

Seventy-three of the subjects took more time for the actual writing in the first selection than in the second, and sixty-eight took more time per word in writing the first selection than in writing the third. The long and unfamiliar words in the Address at Gettysburg may account for part of this slow writing rate, but there is enough difference to indicate that in writing a selection from memory the need for recalling exact wording retards writing speed.

Since writing to reproduce a story is more likely to involve the use of unfamiliar words than writing on a selected topic, the writing rate of the first composition might be expected to be slower than that of the second. Yet forty-eight, or fifty-seven per cent, of the subjects took more time per word in the second composition than in the first. The median time per word was also longer for the second set of compositions than it was for the first.

There is evidence here to suggest that when pupils write on unfamiliar material and must compose as they go along, as they did in the second composition, they have a tendency to slow down in their actual writing rate.

Regularity of the flow of words.—A comparison was also made of the indices of the flow of words in the two compositions. They ranged from .67 to 4.72 with a median of 1.80 and a standard deviation of .73 for the first group of compositions and from .80 to 4.33 with a median of 1.89 and a standard deviation of .78 for the second group. The wide range in the first group of compositions is the result of a few extremely high indices, for there were only six indices above 2.80 in the first group while there were thirteen in the second.

Fifty-one, or 61 per cent, of the pupils had a higher index of flow of words in the second composition than in the first; but the coefficient of correlation between the indices of the two sets of compositions was .77 with a probable error of .03.

The higher indices of flow of words for the second group of compositions as revealed by their range, median, and standard deviation as well as the fact that the majority of the subjects had a higher index in the second composition than in the first imply a retardation in flow of words when pupils write original compositions that must be composed as they write.

Writing speed and the flow of words.—The average time per word for actual writing and the index of flow of words in each of the two sets of compositions were compared to bring to light any relationship that might exist between them.

The coefficient of correlation between writing speed and the indices of flow of words was found to be .34 with a probable error of .07 for the first group of compositions and .29 with a probable error of .07 for the second group. These correlations are sufficiently high to indicate a positive relationship between fast writing and rapid flow of words.

The compositions were arranged according to writing time from the highest number of seconds per word to the lowest, and then divided into four equal groups. The mean index of flow of words was then found for each group, or quarter, of the compositions. The results are given in Table I.

TABLE I

THE MEAN INDICES OF FLOW OF WORDS FOR
EACH QUARTER OF COMPOSITIONS
ARRANGED ACCORDING TO
WRITING SPEED

Writing Time	Mean Index of Flow of Words	
	First Set of Compositions	Second Set of Compositions
Highest Quarter...	2.22	2.58
Second Quarter...	2.01	1.84
Third Quarter....	1.81	1.81
Lowest Quarter...	1.67	2.00

In the first set of compositions the mean indices decrease regularly with a corresponding decrease in writing time per word. The same trend is apparent in the second set of compositions, although it is not as regular and consistent. The trend is clear enough to indi-

cate, however, that as the flow of words increases the speed of writing also increases. This is especially true in compositions involving writing on familiar material.

The results point to the probability that some pupils have a slow reaction time that affects their rate of writing as well as their flow of ideas.

Other compositional factors that were considered in their relation to the flow of words were the prevalence of certain linguistic constructions, the length, and the quality of the compositions.

SUMMARY AND CONCLUSIONS

In an investigation such as this all the factors that may be presumed to be related to flow of words have to be considered. Obviously, not all of them will prove to be related. In some cases the relationship may be so little as to result in practically zero correlation.

The comparisons between flow of words and some of the factors studied may indicate a relationship that is merely indirect. These factors may be related because of their high correlation with other factors that are related to flow of words.

The conclusions at the end of each section will deal primarily with the more important relationships revealed by the comparisons made in that section. A discussion of the significance of these relationships will be reserved for the last section.

Inasmuch as the number of subjects whose compositions were used in this study is comparatively small, the conclusions should be interpreted as suggestive of trends rather than as conclusive evidence of relationships.

In this section the three samples of writing submitted by each subject were carefully studied and compared to bring to light any factors within the compositions that might affect the rate of the flow of words during writing. A brief summary of the results is presented in the statements that follow:

1. A comparison was made of the time in seconds per word for actual writing in each of the three selections of each subject. The rate of writing in the first selection, writing from memory, was slower than that of either of the two compositions. Of the two sets of compositions the second, which involved writing on selected topics, showed a slower writing rate than the first, a reproduction of a story. The difference between the rates of

the two compositions, however, was not so great as the difference between the rate of the first selection and either of the compositions. These comparisons point to the conclusion that the necessity of recalling exact wording and the need of organizing material during the process of writing affect writing speed adversely.

2. A comparison of the rates of flow of words in the two sets of compositions revealed that on the whole the pupils hesitated more while writing on selected topics than they did while writing to reproduce a story with which they were familiar.

3. The writing speed and rate of flow of words were compared for each group of compositions. The comparisons showed that rapid flow of words and rapid writing went together with a tendency to decrease and increase concomitantly. This tendency was not as clear in the second group of compositions as it was in the first.

4. The second group of compositions was carefully analyzed for the presence of linguistic constructions that reveal dominant traits of the writers. The four types of constructions considered are: (1) the Adjective-Verb Quotient, denoting emotional stability; (2) the Index of Subordination, signifying linguistic maturity; (3) the Personal Pronoun Index; and (4) the First Person Pronoun Index, both showing the extent of social development.

The comparisons showed no relationship between emotional stability, as measured by the Adjective-Verb Quotient, and rate of flow of words. The comparisons did show an apparent tendency for those pupils who were on the higher and lower ends of the scale of linguistic maturity or the scale of social development to write with a slower flow of words than those near the middle of the scale. Those on the higher end, however, had a better flow of words than those on the lower end.

5. Composition length, as determined by the number of words, was compared with the rate of flow of words for each of the two sets of compositions. In the first set those who wrote compositions of medium length had the best rate of flow of words, but in the second set those who wrote the longest compositions had the best rate. Those who wrote short compositions had a comparatively slow rate of flow of words. This was especially true in the second group of compositions.

6. The compositions were rated by three junior high English teachers. The mean coefficients of correlation of their ratings were .70 for the first set and .58 for the second set. The distribution of the ratings of the teachers shows that while the marks of the second set of compositions are spread out more over the whole range of quality, than those of the first set, the quality of the compositions in the second set, on the whole, is better than that of the compositions in the first group.

The sum of the point values of the three ratings was taken as the measure of quality and compared with their corresponding indices of flow of words. The comparisons for the first set of compositions showed no relationship between quality and the rate of flow of words. The comparisons for the second set showed a tendency for the pupils who write compositions of very inferior quality to hesitate a great deal as they write.

7. The comparisons reveal that a relatively slow flow of words may be expected when pupils write on unfamiliar material, when they are at the higher and lower ends of the scales of linguistic maturity and social development, especially at the lower end, and when they write compositions that are extremely short or of very inferior quality.

SECTION IV

ACADEMIC FACTORS AND THEIR EFFECT ON THE FLOW OF WORDS

INTRODUCTORY STATEMENT

Linguistic ability is commonly considered to be in part a result of academic training. It is frequently assumed that training in those school subjects that involve language skills will affect a pupil's ability to express his thoughts in writing.

The validity of this assumption may be tested by a study of the relationships between ability in these various subjects and facility of written expression.

The purpose of this chapter is to report on the phases of such a study. Ability in the fields of reading, spelling, and language were compared with facility of expression as measured by the rate of flow of words during composition writing.

SUMMARY AND CONCLUSIONS

In an effort to discover the relationship between ability in academic subjects involving language skills and the rate of flow of words during composition writing, comparisons were made between scores designating ability in those subjects and the indices of flow of words for the two sets of compositions. The scores included English marks for eight semesters as well as scores on standardized tests in reading, vocabulary, spelling, language usage, mechanics of expression, effectiveness of expression, and prose appreciation.

The first step toward finding the relationship between the scores in those subjects and the flow of words was to compute the coefficient of correlation between the indices of flow of words for each set of compositions and the scores on the standardized tests. A summary of the coefficients of correlation with their probable errors for each of the subjects is given in Table II.

Inasmuch as the correlations revealed little or no relationship between the test scores and the flow of words, other comparisons were made. The scores were arranged in order of rank from the highest to the lowest, and divided equally into four groups. The mean index of flow of words was then found for each of these groups or quarters.

The comparisons reveal:

1. That pupils who indicate by standardized test scores that they have low reading, vocabulary, and spelling ability also have a slow flow of words during writing.
2. That the best spellers show a tendency to hesitate between words when writing compositions, although their rate of word flow is not as slow as that of the poor spellers.

3. That a low level of ability in language, as indicated by school marks, appears to be accompanied by a rapid flow of words during composition writing. Pupils who are just slightly below average in language ability have a comparatively slow flow of words.

4. That pupils with high scores in language usage are apt to have a rather free and rapid flow of words during composition writing. This rate of word flow has a tendency to slow down as the pupils' scores become lower. Pupils who show a very limited knowledge of language usage, however, seem to pause very little between words as they write their compositions.

5. That the pupils with the best scores in mechanics and effectiveness of expression tend to have the most rapid flow of words. Those with low scores have a slow rate of word flow. The change from slow to rapid rate is not regular, however, and does not proceed concurrently with improvement in mechanics or effectiveness of expression.

6. That prose appreciation seems inversely related to rate of flow of words, for the pupils with the highest scores on the prose appreciation test had the slowest flow of words. Pupils with low scores also showed a slow flow of words, however; but their rate was not as slow as that of the pupils with the high scores.

7. That on the whole pupils with low scores in the school subjects involving language skills tend to have a slow rate of flow of words during composition writing.

8. That a high level of ability in school subjects that involve language skills does not guarantee a rapid flow of words. It may tend to retard word flow.

TABLE II

COEFFICIENTS OF CORRELATION BETWEEN SCORES ON ACHIEVEMENT TESTS AND INDICES OF FLOW OF WORDS

Subject	First Compositions		Second Compositions	
	Coefficient of Correlation	Probable Error	Coefficient of Correlation	Probable Error
Reading:				
Paragraph Meaning	.03	.07	.03	.07
Word Meaning	.10	.07	.14	.07
Spelling	.04	.07	.13	.07
English marks	.00	.07	-.01	.07
Language usage	.00	.07	-.02	.07
Mechanics of expression	-.03	.07	.08	.07
Effectiveness of expression	.13	.07	.11	.07
Prose appreciation	-.09	.07	-.12	.07

SECTION V

PERSONAL AND ENVIRONMENTAL
FACTORS AND THEIR EFFECT
ON THE FLOW OF WORDS

INTRODUCTORY STATEMENT

Language is a part of every individual's development, but what language he uses depends on the group into which he is born.²

The language one uses is probably the basis upon which his general culture and personality are judged more often than any other single index. What one says and his way of saying it are interpreted almost universally as indicative of the kind of person he is.³

From these statements it is evident that language is considered as something personal and that a study of the language habits of any group must include a consideration of the individuals in that group and the environment to which they have been exposed.

In so far as rate of flow of words is a measure of linguistic behavior, it cannot be understood without a consideration of the personal and environmental factors involved. Several personal traits and measures of personal development were considered, therefore, in an effort to determine their effect on the rate of flow of words.

The personal factors included chronological age, grade in school, mental age, intelligence quotient, sex, perseverance, ascendance-submission, extroversion-introversion, emotional stability, handedness, and eye dominance. The environmental factors considered were socio-economic status, as determined by the occupation of the father, and place among other children in the family.

SUMMARY AND CONCLUSIONS

The coefficients of correlation were computed to determine the correlation between the various personal factors and the flow of words, but because they were low and because correlations do not take into account all the possibilities of relationship, a second group of comparisons was made.

The scores and measures of the various personal factors were arranged in order of

² *Language in General Education*, A Report of the Committee on the Function of English in General Education for the Commission on Secondary School Curriculum (New York: D. Appleton-Century Company, 1940), p. 10.

³ M. R. Trabue, *Teaching Language in the Elementary School*, Forty-third Yearbook of the National Society for the Study of Education, Part II (Chicago: National Society for the Study of Education, 1944), p. 1.

rank and divided into four equal groups. The mean indices of flow of words were then computed for these groups and for other groups that designated personal traits. These comparisons revealed:

1. A definite relationship between chronological age and rate of flow of words. The rate of flow of words was found to increase with increasing chronological age.

2. That the rate of flow of words increases as the pupils pass from grade to grade. Ninth grade pupils had a better flow of words than eighth graders, and eighth grade pupils had a better flow of words than seventh graders. Since there is a high correlation between chronological age and school grade, these findings corroborate the conclusion that rate of flow of words is associated with chronological age.

3. That there is a relationship between mental age and flow of words. The pupils with the high mental ages showed a rapid flow of words and the pupils with the low mental ages showed a slow flow of words. The increase in rate of flow of words that accompanies rise in mental age is not as rapid as the increase that accompanies rise in chronological age during the junior high school years.

4. That pupils with very low and very high intelligence quotients seem to have the best flow of words.

5. That girls do not consistently have a better rate of flow of words than boys. The seventh grade girls had approximately the same rate of flow of words as the boys; but as the rate increased with the rise in school grade, the rates for the girls showed a more rapid increase than those for the boys.

6. That pupils who are rated high in perseverance are apt to have a rapid flow of words as well as those who are rated low. Those near the middle of the scale show a tendency to write with greater hesitation.

7. That the strong, dominating type of pupils as well as the meek and submissive type, as indicated by personality test scores, show a tendency to compose freely and without much hesitation. Those who fall between these two extremes may be expected to have a slower rate of flow of words during their composition writing.

8. That extroverted pupils pause very little between words as they write their compositions, but as pupils tend toward introver-

sion the number and length of pauses seem to increase.

9. That emotionally stable individuals write their compositions with a comparatively free and rapid flow of words. The rate of flow of words decreases as the individuals show increasing indications of emotional instability.

10. That pupils with right hand and right eye dominance and consistent hand eye dominance have a better rate of flow of words than others. Pupils with crossed hand eye dominance show a slow flow of words.

11. That the evidence regarding the relationship between socio-economic status and rate of flow of words is not very definite, but there is some indication that pupils who have socio-economic advantages write with a better flow of words.

12. That there is no relationship between rate of flow of words and position among children in the family. Only children, oldest children, youngest children, and others all showed approximately the same mean indices of flow of words.

SECTION VI

DETAILED ANALYSIS OF INDIVIDUAL RECORDS

INTRODUCTORY STATEMENT

Another phase of this investigation of flow of words during composition writing involves a study of the individual records of the subjects. An analysis of these records to determine the frequency and location of pauses may uncover some very significant facts.

It has already been pointed out in Section III that the pupils who wrote very inferior compositions showed great hesitation during their writing, as indicated by their high indices of word flow. It is important to know how the composing structure—that is, the number, length, and location of the pauses—differs from that of the good compositions. The records of each of the nine best compositions were therefore carefully analyzed and compared with the records of the nine poorest compositions to discover differences in length and location of pauses.

The question of whether rate of word flow is related to composing ability has not been definitely answered by the comparisons made so far in this investigation. If good compos-

ing, like good reading, requires the grouping of words into thought units, the number and location of pauses ought to reveal composing ability. The records of the five subjects with the highest indices of word flow were therefore examined for length and location of pauses and compared with the records of the five subjects with the lowest indices of word flow.

ANALYSIS OF THE RECORDS OF GOOD AND POOR COMPOSITIONS

Records of the nine best compositions.—

The records of the subjects with the nine best compositions were first analyzed for composing structure. The record of the best composition is reproduced for the purpose of illustration. The dashes between the words represent pauses, each dash representing a pause of three-tenths of a second. No dash is used when the pause is less than a half second.

Inasmuch as the indices of word flow vary with the different compositions, it was necessary to decide on some method of determining significant pause length for each composition. The following procedure was adopted:

A time length for significant pauses was arbitrarily selected. The pauses of that length and longer were then counted and classified as either those which separated units of thought or those which broke up units of thought. A pause length slightly longer was selected and the pauses were again counted and classified to determine any change in the proportion of the one kind of pause to the other. If there was no change, pauses of shorter duration were counted and classified. If the ratio remained the same, a smaller time interval was used and again the smaller pauses were classified. The time interval at which the ratio of pauses that break up thought units to pauses that separate thought units increased perceptibly was selected as the significant pause length for the composition. Only pauses of significant time length were considered in the comparisons.

The best composition was written by Subject 51. The record follows:

Splash,..splash,..the dip...of the oars sent a thrill....to...my heart as the small row...boat pulled out away from the...dock. I was going fishing...for...the first..time.....

Surrounded..by tackle and...hooks I cast my line into....the water..and sat waiting....for the first..bite, which,...I...felt confident,....would come in...a few minutes.....

Much time...elapsed and...still...not even a nibble...d r a g g e d...the...peacefully...bobbing...float beneath...surface..."Remember,"...my uncle...was saying,..."don't...stand...up...when you catch a fish...You...might...fall.".....

His words...fell on deaf...ears...My...bobber...was acting...very strangely...Then...suddenly...it went completely...beneath...surface...Struggling...to my...feet...and...waving...my arms I...shouted,..."I've got a fish, I've...got a fish.".....

Then it...all...happened at...once. There...was a big...splash...and I felt...myself...sinking...down, down,...into...the blue depths...There...was a moment of oblivion...and...then...I found...myself...lying...prostrate...on the bottom of the...boat...My uncle was standing...over me and shaking...his head...disgustedly.....

We came that night...without...any fish...and...I...felt that the...worst part of the enterprise...was the lecturing...I got when...I got home...I resolved then...and there that...I would...if...I ever went...fishing...again...I would...never, never stand up...in the boat.

The record indicates that this composition was written with few extremely long pauses. The longest pauses occurred at the end of paragraphs, and the pauses of one and a half seconds and longer occurred consistently between groups of words that represent thought units.

Analysis of the records of the nine best compositions reveals great individual differences among the writers in composing fluency. Some write with few and short pauses while others hesitate frequently and for comparatively long periods of time.

The general trend of the pauses in these nine compositions, however, follows a definite pattern. The longer pauses generally occur between groups of words that represent thought units, and the shorter pauses occur within these groups of words. There is evidence to conclude that the good writers proceed by thought units, writing each unit as it comes to them.

The pattern is distorted when the writer indicates by the crossing out of words that he is not fully prepared for the writing or that he has not fully thought through his material. In such cases the writing is stopped and the words crossed out even before the entire thought unit has been written. From this it appears that the thinking is well in advance of the writing, and that the pupil, while writing a thought unit, is already framing the next.

Records of the nine poorest compositions.—The records of the nine compositions that were given the poorest ratings were also analyzed.

The record of the composition of Subject 75, given a rating of 7, follows:

One...New...Year's Day...when...I was...just...sitting...around...the...house...and didn't...have...nothing...to...do...I...planned to go...hunting...out to...my Grandad's...house...When...I left I took...25...shells...along for my...410...shot gun...I...walked...out there...part...of the way...Then...when I...was...getting...tired...I...planned to...start...hitch...hiking...and I did...I got a...ride...out there...When...I got...there...I...got...my...uncle's...dog out...and...went...out...into...the...pasture...Then I let the dog go...and...find...some pheasants to...scare up...he did. And...I wasted...5...shells on...a pheasant...but...I...got...his...tail...feathers...About...an hour...later...the...dog chased up...a...rabbit...I got...him but...could...not...eat him because...he...was full...of...worms...Then the dog...scared up...the...same...pheasant...he...did...the...first...time...I got...him...right...through...the...head...Then...after...roaming...out...there...about...three...hours...and not a...thing...to shoot at...but a...few...squirrels...I planned to go...home...when...I got up...to...my...grandad's...house...my...uncle...w a s...going...to...town...so...I rode...home...with...him...

The...next...n i g h t...we...had...pheasant...for supper...Does...it...ever taste...good...if...you...kill...and...cook...it...yourself.

This composition, with an index of word flow of 2.87, has thirty-five pauses longer than two and a half seconds. The original composition was written on both sides of a sheet of paper, and one of the pauses occurs at the place where the paper was turned over. Of the remaining thirty-four pauses, eleven break up units of thought and twenty-three separate thought units.

A comparison of the nine best and nine poorest compositions reveals that the better compositions are more definitely written in thought units. A summary of the analyses

made of the records of the eighteen compositions shows that in the nine best compositions only twenty-four pauses, or 17 per cent, occur between words of a thought unit and 115 pauses, or 83 per cent, come at the end of thought units. In the nine compositions with the lowest rating of quality forty-seven pauses, or 31 per cent, occur between words of a thought unit and 107 pauses, or 69 per cent, separate groups of words expressing units of thought. In short, in the compositions of poor quality the pauses that break up thought units occur approximately twice as often as they do in the compositions of better quality.

The comparisons also reveal that the pauses are longer in the poorer compositions. The average index of word flow is 1.6 for the best compositions and 2.3 for the nine poorest compositions. Of the pauses longer than two and a half seconds, 115 occur in the nine best and 165 in the nine poorest compositions.

The evidence is clear, therefore, that poor composition writing is accompanied by or the product of uncertainty of expression. This uncertainty is reflected in the breaking up of thought units and the use of long pauses.

ANALYSIS OF THE RECORDS OF COMPOSITIONS WITH HIGH AND LOW INDICES OF WORD FLOW

Additional evidence on composing ability may be gained from a study of the records of the compositions with highest and lowest indices of word flow. An examination of these records will bring to light any relationship that may exist between composing speed and composing structure.

The records of the five compositions with lowest indices of word flow were analyzed and compared with the records of the five compositions with highest indices of word flow. The records and the graphs which illustrate the location of the pauses are given in the following pages.

The graphs illustrate the composing structure of the first fifty words in each of the compositions. The heavy horizontal line represents a continuous time-line in writing the composition, and the round black spots represent the words. Each of the ten heavy horizontal lines is divided into ten sections, so that each section represents 1 per cent of the total time of the pauses between the fifty

words, for the spacing is expressed in per cent of total time rather than in actual time units. The numbers above the black spots correspond with the numbers above the words in the record of the composition.

Records of the compositions with the lowest indices of word flow.—The pupil who had the lowest index of word flow, .80, is Subject 79. The record of the composition follows:

1	2	3	4	5	6	7	8
Jean..and	I	were	playing..on..her	front..			
9	10	11	12	13	14	15	
porch	when	along..	came	Georgia..Lou..	We		
16	17	18	19	20	21	22	23
started...	pushing	her	on	the	swing	but...	she
25	26	27	28	29	30	31	32
wanted..	to..get..	off...	We..	wouldn't	let	her	but
34	35	36	37	38	39	40	41
...finally...	she	managed..	to..run..	off	and	ran	
42	43	44	45	46	47	48	49
home	yelling..	back..	that	she'd	get	her	daddy
...	shoot..us..	Of	course	we	were..	scared	stiff...
and..	ran	into..	Jean's..	house..	to..hide..	in..a..	
closet..	but	her	mother	wouldn't..	hear..	of	it..
We	..ran	to	my...	house	but	my..	mother..
equally..	unsympathetic...	We...	ran	outdoors..			
again	thinking.....	we	wouldn't	see	the	light	
of...	day	again.....	In	our	garage.....	was	our
car	with..	the	doors...	unlocked..	We...	went..	
inside..	and..	both	lay	on..	the..	back..	seat...
for	Jean	told..	me	not	to	lie....	on
the	man....	could	feel	that...	We	lay	there..
quietly	..scarcely..	breathing.....	All	of	a	sudden	we
heard...	footsteps.....	and	our	hearts...	stopped		
..beating....	They..	walked..	around	in	the	garage	
..and..	finally..	went	out...	We	lay..	there	for
about..	half	an	hour.....	and	finally..	got..	up.
...We..	saw	the	light	of	day	again...	anyway...
didn't..	we?						

This composition has six pauses of one and a half seconds or longer. Five of these pauses clearly separate groups of words that represent thought units. The one between the words "thinking" and "we" in the twelfth line may be considered doubtful, but it is possible to group the words in the sentence so that the word "thinking" is a unit by itself.

The graph shows how uniformly the first fifty words of the composition are spaced.

Similar records and graphs of the other four compositions with lowest indices of word flow were also made, and all five of these records indicate that on the whole the subjects wrote in thought units. The composition of Subject 26 is an exception, but there is some evidence of confusion in the first part of this composition where practically all of the pauses fall.

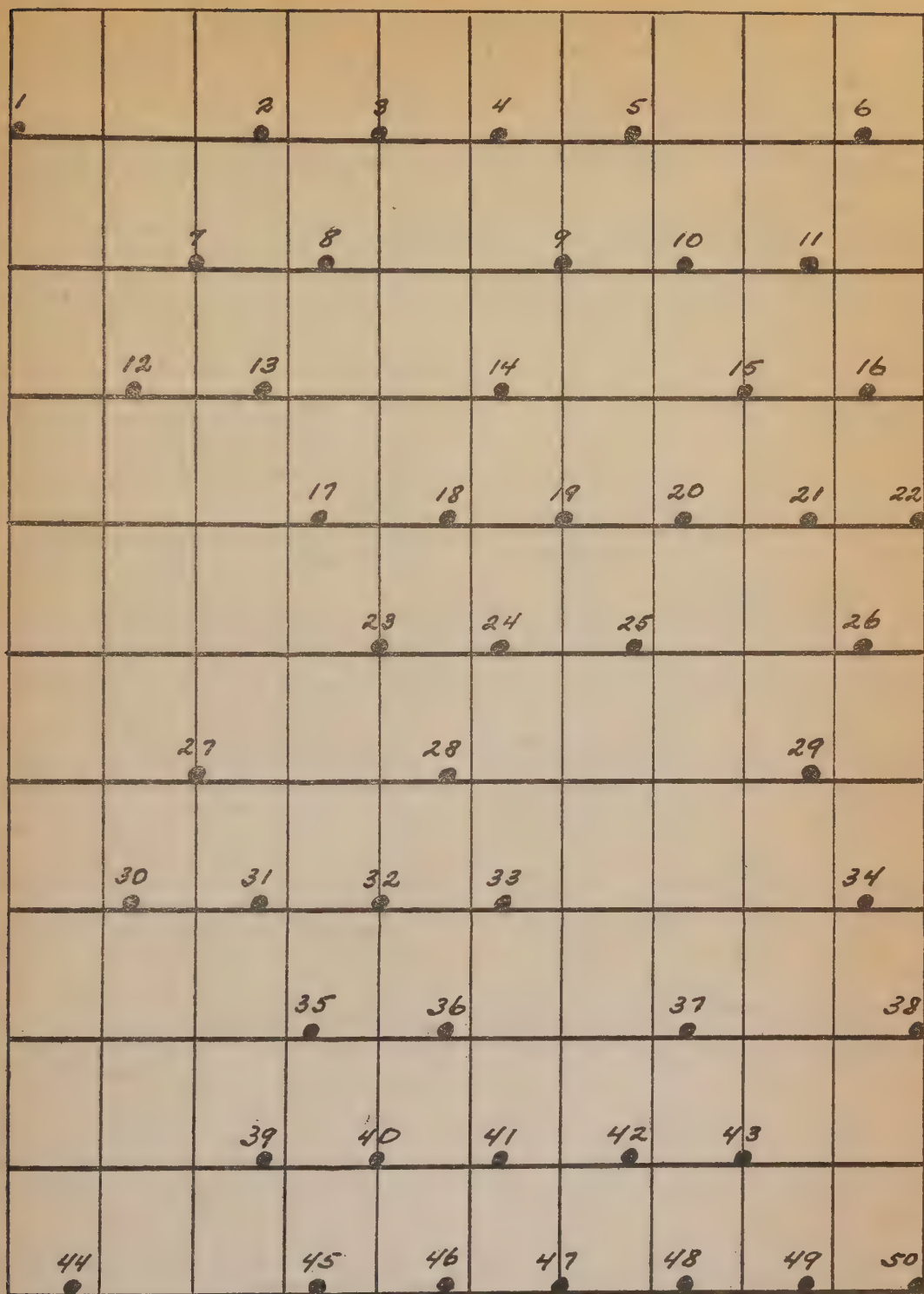


Fig. 2. Rhythm of Word Flow of Subject 79.

Records of the compositions with highest indices of word flow.—The composition with the highest index of word flow, 4.33, was written by Subject 1. The record follows:

1	2	3	4
My.....	most.....	embarrassing.....	experience
5	6	7	8
...happened...	when...	I was.....	about
10	11	12	13
..ten.....	years.....	of.....old.....	My
15	16	17	18
.....mother.....	had.....	just.....	given.....me.....a...
21	22	23	24
kitten.....	for.....	my...birth...	day
			26
.....	.....	.....	T h a t
27	28	29	30
....night.....	she.....	was.....	going.....to.....
32	33	34	
give.....a.....	party.....	.....	.....
35	36	37	38
..I.....wanted.....	to.....stay.....	up.....	but.....she
42	43	44	45
.....said.....	I had.....	to.....go to.....	bed.....
		49	50
.....	.....	Of course.....	I..
didn't.....	go.....to.....	sleep.....	but.....just
.....laid.....	there.....	.....	.....
.....	After.....	a.....while.....	the
.....	blankets.....	started.....	.....
feeling.....heavy.....	around my.....	neck so.....	.....
.....I.....	reached.....	up.....	.....
..to.....	pull.....the.....	off.....	who.....
.....	.....	.....	I.....
.....I.....	started.....	pulling.....	.....
t h e m.....	without.....	thinking.....	.....
suddenly.....	I her.....	heard.....my.....	cat.....let
.....out.....	a.....	loud.....	meow.....
.....I.....	felt.....	my.....	t h e n
hands.....	around.....	something.....	furry.....
.....	.....	Without.....	.....
.....	thinking.....	I.....	.....
started.....	to.....	sc.....	scream.....
.....	My.....	bedroom.....	w
.....was.....	right.....	next.....	to.....
.....the.....	living.....	room.....	.....
.....a n d.....	bother.....	my.....	mother.....
and.....my.....	dad.....c a m e.....	.....	run
.....ning.....	.....	.....	.....
.....My.....	dad.....	turned.....	on.....the..
light.....	.....	a n d.....	there.....
..lay.....my.....	c a t.....	.....	right.....
.....around.....	my.....	n e c k.....	.....
.....	A f t e r.....	.....	.....
hitting.....the.....	cat.....	a few.....	times.....
and.....putting.....	.....	h i m.....	in.....
the.....kitchen.....	.....	.....	.....
my.....d a d.....	came.....	back.....	in.....
in.....the.....	bedroom.....	.....	.....
.....he.....	.....	g a v e.....	me.....a...
good sound... paddling.....	.....	.....	.....
.....just.....	to.....	wake.....	.....
.....me up.....	.....	.....	.....

.....Now.....every.....time.....
I see one of.....those.....ladies.....
laugh.....at.....me.....
 This.....was.....my.....most.....embarrassing.....
 moment.....

There are thirty-seven pauses longer than three seconds in this composition. Two of these pauses, those in the nineteenth and twentieth lines, follow crossed out words. Although it is quite evident that the crossing out of these words was due to lack of clarity concerning the order of events in the story, it is difficult to classify the pauses with either those that come at the end of a thought unit or those that break up thought units. They therefore will not be considered.

Of the remaining thirty-five pauses longer than three seconds, twenty-one come at the end of groups of words that express units of thought, while fourteen fall between the words of a thought unit.

There are another thirty-seven pauses from two to three seconds long. One of these can be associated with a crossed out word, but nine occur at the end of thought units and twenty-seven break up units of thought. Inasmuch as the number of pauses that break up thought units increases so rapidly when the pause length is reduced, it is best to consider only those pauses longer than three seconds.

The graph of the first fifty words of this composition indicates a variable rate of word flow. There are five comparatively long pauses, and they come at irregular intervals.

The records and graphs of the other four compositions with high indices of flow of words reveal that those subjects also used long pauses at irregular intervals.

A summary of the analyses made of the records of the five compositions with the lowest indices of word flow and of the records of the five compositions with the highest indices of word flow shows that in the former group there were forty-five long pauses. Eleven of these pauses, or 24 per cent, broke up units of thought. In the five compositions with the highest indices of word flow there were 108 long pauses. Of these, forty-one, or 38 per cent, broke up thought units. This comparison indicates that on the whole the compositions with low indices of word flow are more definitely written in thought units.

The graphs illustrate the fluency of word flow in the compositions. The graphs of the compositions with lowest indices reveal

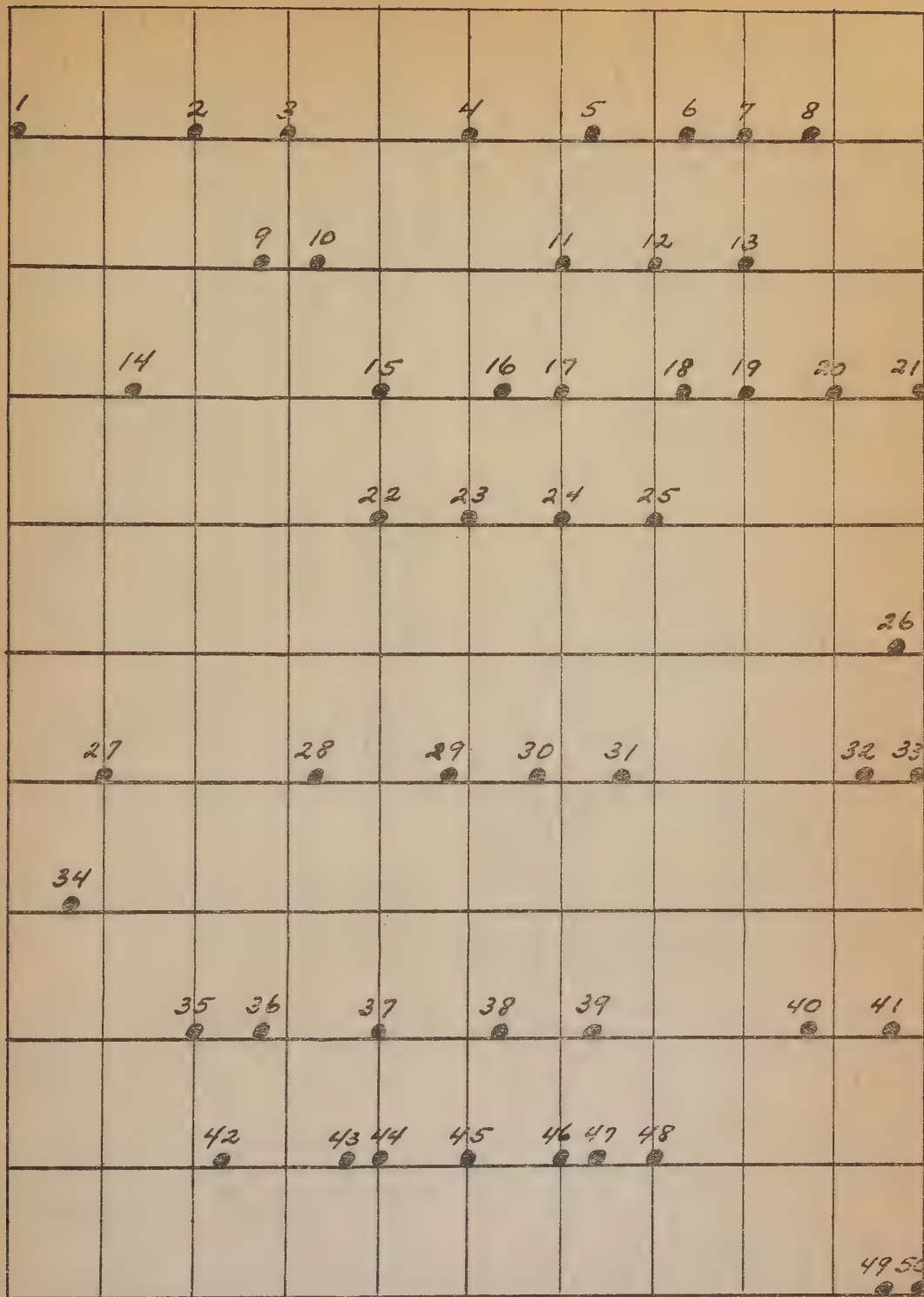


Fig. 3. Rhythm of Word Flow of Subject 1.

greater uniformity and rhythm in the rate at which words come to the writer than do the graphs of the compositions with highest indices of word flow.

SUMMARY AND CONCLUSIONS

For purposes of comparison a detailed analysis was made of each of the records of the nine compositions that were given the highest rating for quality and of the nine compositions that were given the lowest ratings. The records were compared for the purpose of determining differences in composing structure; that is, the number, length, and location of pauses, between good and poor compositions.

The records of the five compositions with the lowest indices of word flow were also analyzed and compared with the records of the five compositions with the highest indices of word flow. The purpose of these comparisons was to learn if writing in thought units facilitates flow of words.

A summary of the results of the comparisons is given in the following statements:

1. Analysis of the records of the compositions reveals great differences among individual writers. There are differences in length, frequency, and location of pauses between words.

The lengths of the pauses vary with individual pupils. At one extreme are those pupils who pause infrequently during their composition writing; and when they do hesitate, they do so for only a short time. At the other extreme are those subjects who pause frequently and for long periods of time.

Pupils also differ greatly in the number and location of pauses that occur in their compositions. Some group words into thought units while they write and pause only when they come to the end of a thought unit. Others apparently write by words, for their pauses come between the words of a thought unit as well as at the end of thought units.

There are differences even in the flow of words within groups. In some compositions the words in a group follow each other in rhythmic order with short, consistent pauses between the words. In others the flow of words is jerky, and the pauses between the words vary in length.

2. Comparisons of the records of the nine compositions that were given the highest rating for quality and the records of the nine

compositions that were rated lowest for quality reveal:

a) That the best compositions, on the whole, were more definitely written in thought units. Of the 139 pauses of significant length in the nine best compositions 115, or 83 per cent, occurred at the end of thought units; and of the 154 pauses in the compositions of poorest quality 107, or 69 per cent, came at the end of thought units.

b) That, on the whole, the pauses are longer in the poor compositions than in the best compositions. Of the pauses longer than two and a half seconds 115 occur in the nine best and 165 occur in the nine poorest compositions.

c) That when the number of crossed-out words or groups of words is used as a measure of certainty of content, there does not appear to be any relationship between compositional quality and certainty of content. Table 3 gives the distribution of the number of crossed-out words for each of the two groups of compositions. It is significant that the two median as well as the two mean number of crossed-out words are approximately the same.

TABLE III
NUMBER OF CROSSED-OUT WORDS IN THE NINE
BEST AND NINE POOREST COMPOSITIONS

Number of Cross- ed-out Words or Groups of Words	Best Compositions	Poorest Compositions
12-----	1	----
11-----	----	----
10-----	----	----
9-----	----	----
8-----	----	1
7-----	1	----
6-----	----	2
5-----	----	----
4-----	1	1
3-----	2	1
2-----	1	----
1-----	2	3
0-----	1	1
Median-----	2.75	3.00
Mean-----	3.67	3.33

d) Sufficient evidence to conclude that a relationship exists between word flow and compositional quality. The best compositions are written in thought units, with a rhythmic flow of words, and with comparatively few and short pauses.

3. Comparisons of the records of the five compositions with lowest indices of word flow

and the records of the five compositions with highest indices of word flow reveal:

(a) That there is a relationship between rate of word flow and writing in thought units. Of the 45 significant pauses in the five compositions with lowest indices of word flow 34, or 75 per cent, separated groups of words representing thought units; and of the 108 significant pauses in the five compositions with highest indices of word flow 67, or 62 per cent, came at the end of thought units.

(b) That there appears to be a relationship between rate and uniformity of word flow. On the whole, the flow of words in the five compositions with lowest indices of word flow was rhythmic and uniform; while that of the compositions with highest indices of word flow was jerky and irregular.

(c) That when the number of crossed-out words or groups of words is used as an indication of certainty of content, the evidence points to a positive correlation between rate of word flow and certainty of content. The pupils with the lowest indices of word flow are more sure of their stories than those with the highest indices. Of the former group of five, one had one crossed-out word, one had two, and three had none; of the five with the slowest rate of word flow two had three crossed-out words, one had four, one had five, and one had seven.

4. The number of records examined is relatively small and the results of the comparisons cannot be accepted as highly reliable, but the data indicate:

(a) That good compositions are written predominantly in thought units. Whether writing by thought units is indicative of a linguistic maturity that results in the writing of better compositions has not been determined. Investigations in this area should prove interesting and fruitful.

(b) That writing in thought units accelerates the flow of words. Again, it has not been determined if writing in thought units is indicative of a linguistic maturity that results in a more rapid flow of words. This area also should be investigated.

(c) That slow composing rate is accompanied by much uncertainty during writing. If the number of crossed-out words is an indication of lack of careful planning before beginning the actual writing of the composition, then careful planning helps to accelerate the flow of words.

SECTION VII

SUMMARY AND CONCLUSIONS

DESCRIPTION OF THE INVESTIGATION

The rate of flow of words during composition writing was investigated in its relation to factors within the compositions and academic, environmental, and personal qualities of the writers.

Eighty-four pupils from grades seven, eight, and nine were asked to write two compositions. The first was a reproduction of a story that had been read just prior to the writing and the second was a composition on one of six suggested topics. Records of the time required for the actual writing of each word and of the number and length of pauses between words were obtained by means of a motor driven, time recording kymograph. The average of the larger half of the pauses was taken as the index of the flow of words.

The measure of word flow was correlated and compared with factors within the compositions such as rate of writing, familiar and unfamiliar material, predominance of certain linguistic constructions, length, and quality of compositions; with the academic abilities of the writers in reading, vocabulary, spelling, language, and appreciation of literature; with personal factors including chronological age, mental ability, personality traits, and hand and eye dominance; and with environmental factors such as socio-economic status and place among other children in the family.

A detailed analysis was made of the records of the compositions with highest and lowest ratings for quality and of the compositions with highest and lowest indices of word flow. The results were compared to find the differences in the composing structure of the four types of compositions.

CONCLUSIONS

While the small number of subjects used in this investigation tends to limit the reliability of the evidence discovered and while the conclusions must be regarded as merely suggestive, they are valuable in that they point to relationships that have not previously been brought to light and areas that are in need of further research.

An investigation of the time required for the actual writing revealed that when pupils reproduce a selection from memory they write more slowly than they do when writing com-

positions; but in composition writing they write more slowly when they compose the story as they go along than they do when they reproduce a familiar story.

A comparison of writing rate with the rate of flow of words showed that on the whole the rapid writers enjoy a rapid flow of words and the slow writers have a slow rate of word flow. Whether an individual's writing rate decreases or increases with a corresponding decrease or increase in his rate of word flow was not investigated, but the comparisons do suggest that some pupils have a slow reaction time which affects both their writing speed and their flow of ideas.

A comparison of the rate of flow of words in the two compositions revealed that the index of word flow is remarkably consistent. The coefficient of correlations between the indices of the first group of compositions and those of the second group was .77 with a probable error of .03. In writing the second group of compositions, which required composing as they went along, the pupils showed a slower rate of word flow than they did in the first group of compositions.

Linguistic constructions within the compositions were investigated in their relation to the rate of flow of words. Although no relationship could be found between the Adjective-Verb Quotient and flow of words, it was discovered that compositions with very low indices of Subordination and high Personal Pronoun Indices are written with a very slow flow of words, but that those with high Indices of Subordination and low Personal Pronoun Indices are also written with a slow flow of words, though not as slow as that of the first group. Inasmuch as the evidence is not conclusive as to what these linguistic constructions definitely determine, it is difficult to know what their relationship to the flow of words signifies.

On the whole the shortest compositions as well as those of poorest quality were written with the slowest flow of words, and the longest compositions showed the most rapid rate of word flow. The compositions that were ranked highest in quality, however, did not have the best rate of flow of words.

A study of the relation of academic factors to rate of word flow revealed that the pupils with the lowest scores in reading, vocabulary, and spelling have the slowest flow of words. The coefficients of correlation between these

subjects were .85 for reading and vocabulary, .65 for reading and spelling, and .68 for vocabulary and spelling. These relatively high coefficients suggest that there may be some common element in these subjects that affects the rate of word flow. More research in this area may prove fruitful.

The comparisons also revealed a similarity in the relation of English marks and scores in language usage to the rate of word flow. The coefficient of correlation between these two academic measures is .48, but their relation to rate of word flow is almost identical, especially for the second group of compositions. A likely explanation is that teachers, in marking the ability of the pupils in English, place a great deal of emphasis on language usage.

A study of the relationship between scores in prose appreciation and rate of word flow revealed that pupils with high scores in prose appreciation are inclined to pause a great deal during composition writing.

A coefficient of correlation of .69 between the scores in Mechanics and Effectiveness of Expression indicates that they measure related aspects of English ability; but a comparison of the scores in these subjects with the indices of flow of words revealed that this particular aspect of English ability has no relation to the rate of word flow.

In considering the personal traits of the subjects, it was learned that rate of flow of words increases with increase in chronological age, mental age, and in rise from grade to grade in school. The possibility that these factors may be merely subsidiary and that the increase in rate is due primarily to the additional practice in composition writing which is provided during the junior high school years has not been studied. Further research is needed to determine whether increased rate of flow of words is an accompaniment of increase in chronological age and mental age or the result of additional practice.

The intelligence quotient, although a measure of mental ability as well as mental age, has a different effect on the rate of flow of words. The relationship is curvilinear, with a rapid rate of word flow shown by pupils with both high and low intelligence quotients.

A relationship was also found between rate of flow of words and some of the personality traits. A high degree of perseverance seems to be reflected in a rapid flow of words, and a

decrease in perseverance appears to be accompanied by a decrease in rate of word flow, but pupils with a low degree of perseverance tend again to have a rapid flow of words. The relatively high coefficient of correlation between intelligence quotients and perseverance ratings, .59, gives rise to some speculation as to the relationship between the two. Their relationship to rate of word flow is similar, and the influence of one upon the other is difficult to determine.

Pupils who by their scores on personality tests indicate that they are dominating, extrovertive, and emotionally stable, enjoy a rapid flow of words. Those who are introvertive and emotionally unstable have a slow word flow.

A comparison of the composing rates of girls and boys revealed that while both sexes have approximately the same rate in the seventh grade, the girls increase their rate more rapidly than the boys as they proceed through the grades.

A study of hand and eye dominance in its relation to rate of flow of words revealed that pupils with right hand and right eye dominance, on the whole, compose with fewer and shorter pauses than those with left hand and left eye dominance. Those with crossed hand and eye dominance have an extremely slow flow of words. The matter of dominance, especially of crossed dominance, is in need of further investigation.

Since the average chronological age of the pupils with right hand, right eye, and right hand-right eye dominance is 163 months compared with 158 months for those with left hand, left eye, and left hand-left eye dominance, it is difficult to determine to what extent the difference in rate of flow of words is due to the difference in chronological age. The sixteen pupils with crossed hand-eye dominance had a mean chronological age of 160 months. Their mean index of word flow is considerably higher than that of any of the other groups. Inasmuch as the mean chronological age is approximately half way between the others and the mean index of word flow is higher, it seems reasonable to conclude that the pupils with crossed hand-eye dominance have a slower rate of word flow. The number of cases is too limited, however, to accept this conclusion as completely reliable.

A comparison of the mean indices of word flow for the five levels of socio-economic status revealed that with a rise from Level II

to Level IV there is a decrease in rate of flow of words. The mean chronological age for these three groups ranges from 162 to 164 months; so the change in rate cannot be attributed to the influence of chronological age. The evidence suggests that pupils in the higher levels of socio-economic status have a better rate of word flow than those in the lower levels.

The mean index of word flow for Level I, however, rises sharply while the mean index for Level V shows a sharp decline. The fact that the mean chronological age is 158 months for the pupils in Level I may account for the rise in the mean index, but the mean chronological age for the pupils of Level V is 162 months and cannot be claimed to affect the rate of word flow. The number of cases in these two groups, however, is extremely small and very likely accounts for the change in trend of the mean indices more than any other factor.

The comparison of the mean indices of word flow of only children, oldest children, youngest children, and others revealed an extremely small difference in rate of word flow of these four groups. Evidently, a child's place among other children in the family does not affect his rate of word flow.

A detailed analysis of the records of the nine best and nine poorest compositions indicated great differences among individual pupils in pattern of word flow. Not only is there a great difference in the number and lengths of the significant pauses between groups of word of a thought unit, but the flow of words within groups also varies.

Comparisons of the records revealed that the best compositions are written in thought units, while the poorest compositions give evidence of having been written by words. The poorest compositions are also written with longer pauses.

The records of the five compositions with lowest and the five compositions with highest indices of word flow indicate that writing by words is accompanied by a slow flow of words and writing by thought units is correlated with a more rapid word flow. The compositions written with a slow composing rate manifest very little rhythm in the flow of words.

EDUCATIONAL IMPLICATIONS

The educational implications of the results of this investigation are numerous. A few of them are:

1. The findings of this study corroborate the claim that English is closely related to other school subjects. Pupils who were poor in reading, vocabulary, and spelling indicated a tendency to pause often when writing compositions. English cannot be taught in isolation from other subjects.

2. The teaching of the mechanics of writing does not necessarily result in more fluent composing. Ability in mechanics and effectiveness of expression did not seem to be associated with rate of flow of words.

3. The problem of personality development cannot be divorced from teaching. The dominating, extrovertive, and emotionally stable pupils wrote with a rapid flow of words while those with introvertive tendencies and lack of emotional balance paused often and long during composition writing. It is evident that something must be done for the latter group to give them more confidence and place them more at ease if they are to use their abilities to the best advantage and show improvement in composing rate.

4. Pupils should be taught to plan their writing. The rate of flow of words was much better when pupils wrote familiar material than when they wrote without much preparation. The compositions with the slowest rate of word flow also had the largest number of crossed-out words, and they gave evidence of having been written by words rather than by thought units. Pupils should be encouraged to think through their stories before writing them. There is evidence to believe that this will lead to the writing by thought units and to an increase in rate of word flow.

5. Mere composing fluency should not be the primary objective in composition teaching. Pupils with the lowest scores in perseverance, English, and language usage had a rapid flow of words. Composing fluency that is associated with and the accompaniment of carelessness and lack of perseverance should be discouraged.

On the other hand, the best spellers and those with the highest scores in prose appreciation had a comparatively slow flow of words. Composition teaching should, therefore, encourage a flow of words that is not so

rapid as to promote carelessness but rapid enough to stimulate continuity both of thinking and of expression.

6. Inasmuch as there appears to be a positive correlation between writing by thought units and both rate of word flow and quality of composition, composition teaching should emphasize thinking and writing in thought units.

BIBLIOGRAPHY

- Allport, G. W., and Cantril, H. "Judging Personality from Voice," *Journal of Social Psychology*, V (February, 1934), 37-56.
- Allport, Floyd H., Walker, Lynnette, and Lathers, Eleanor. "Written Composition and Characteristics of Personality," *Archives of Psychology*, No. 173, XXVI (December, 1934), pp. 82.
- Anderson, John E. "An Evaluation of Various Indices of Linguistic Development," *Child Development*, VIII (March, 1937), 62-68.
- Bear, Mata V. "Children's Growth in the Use of Written Language," *Elementary English Review*, XVI (December, 1939), 312-319.
- Boder, David P. "The Adjective-Verb Quotient: A Contribution to the Psychology of Language," *The Psychological Record*, III (March, 1940), 309-43.
- Eisenson, Jon. "Some Characteristics of the Written Speech of Stutterers," *Pedagogical Seminary*, L (June, 1937), 456-58.
- Healy, Katharine L. "A Study of the Factors Involved in the Rating of Pupils' Compositions," *Journal of Experimental Education*, IV (September, 1935), 50-53.
- Hoppes, William Calvin. "The Development of Written Expression among Children of Elementary School Grades," Unpublished Ph. D. dissertation, Department of Education, University of Chicago, 1931.
- La Brant, Lou L. "A Study of Certain Language Developments of Children in Grades Four to Twelve, Inclusive," *Genetic Psychology Monographs*, XIV (November, 1933), 387-492.
- La Brant, Lou L. "The Occurrence of Dependent Clauses in the Writing of School Children in Grades Four to Nine," *Educational Trends*, I (January, 1932), 16-20.
- Language in General Education*, A Report of the Committee on the Function of English in General Education for the Commission on Secondary School Curriculum (New York: D. Appleton-Century Co., 1940), pp. xii + 226.

- Lowen, Maud B. "The Effect of Environment on Creative Ability in Fourth-Grade Children," *Elementary School Journal*, XXXVI (October, 1935), 120-26.
- Lyman, R. L. "Fluency, Accuracy, and General Excellence in English Composition," *School Review*, XXVI (February, 1918), 85-100.
- Sanford, Fillmore H. "Speech and Personality: A Comparative Case Study," *Character and Personality*, X (March, 1942), 169-98.
- Shepherd, Edith Elizabeth. "The Influence of Content and Maturity on Sentence Structure in Pupils' Written Discourse." Unpublished Master's thesis, Department of Education, University of Chicago, 1933.
- Sims, Verner Martin. *The Measurement of Socio-Economic Status* (Bloomington, Illinois: Public School Publishing Co., 1928), pp. 33.
- Stagner, Ross. "Judgments of Voice and Personality," *Journal of Educational Psychology*, XXVII (April, 1936), 272-77.
- Taylor, Harold C. "Social Agreement on Personality Traits as Judged from Speech," *Journal of Social Psychology*, V (May, 1934), 244-48.
- Teaching Language in the Elementary School*. Forty-third Yearbook of the National Society for the Study of Education, Part II (Chicago: National Society for the Study of Education, 1944), pp. ix + 257.

